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SECTION 02558 – SEWAGE PUMPING STATION

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SECTION 02558

SEWAGE PUMPING STATION

PART 1 – PRODUCTS

1.01 GENERAL

Material and equipment used in the Sewage Pumping Station shall conform to this specification.

Pumps and associated equipment and controls shall conform to City of Savannah Section 11100 - "Submersible Wastewater Pumps."

Variable frequency drive controls shall conform to City of Savannah Section 16482 - "Variable Frequency Drive Controllers."

Sewage pumping station stand-by power systems shall conform to City of Savannah Section 16620 - "Sanitary Sewer Pump Station Emergency Stand-By Power System."

Submersible pump station control panels shall conform to City of Savannah Section 16912 - "Submersible Pump Station Control Panels."

1.02 PUMPING STATION

- A. Wet well - Shall be precast reinforced concrete sections conforming to ASTM C-478 or cast-in-place Portland cement conforming to ASTM C150, type II 4,000 psi and absorption shall not exceed 6%. The footing shall be concrete placed on a dry, compacted subgrade. The footing shall be designed to prevent flotation of the empty wet-well structure. The wetwell shall be constructed to the dimensions shown on the drawings. The access hatch in the top slab of the wet well shall have a minimum 48" x 30" (inch) clear opening, with a live load capacity of 300 pounds per square foot. A large access hatch may be required if necessary to allow pump installation and removal. The access hatch shall include a Flygt Safety grate. The material shall be Aluminum Alloy 6063-T5 and T6 1/4" (inch) tread plate, flush type lock with inside spoon handle. The frame shall be complete with hinged and hasp-equipped cover, upper guide holders, chain holders and stainless steel cable holder. Frame shall be securely mounted directly above the pumps. The door shall be torsion bar loaded for ease of lifting and shall have safety locking handle in open position. Fastening hardware used inside the wet well shall be stainless steel. Depth of wetwell shall not exceed 28 feet below existing grade.

The concrete wet-well sections shall be jointed with "Ram-Nek" joint sealer, or equivalent, with primer. The primer shall be applied to all contact surfaces of the concrete wall joint as recommended by the manufacturer. The exterior of all joints shall be wrapped with an epoxy rubber Infi-Shield seal wrap or equal with a minimum thickness of 65 mils.

The Contractor shall furnish and install guide rails for each pump, to permit the raising and lowering of the pump. Guide bars shall be 316 stainless steel and of adequate length and strength to extend from the lower guide holders on the pump discharge connection to the upper guide holder mounted on the access frame. Guide rails shall be installed plumb with stainless steel intermediate supports as required by the Engineer.

All conduit entering pump station should be sealed air tight at the wet well and at the control panel. Once above grade, these conduits shall also have an air gap immediately below the control panel. Conduit shall be sealed air tight on either side of the air gap.

For the protective coating on wet wells and the manholes, see City of Savannah Section 02555 - "Protective Coating for Existing and New Concrete and Masonry Sanitary Sewer Structures." All piping and fittings within a wet well from the pump base to the valve pit shall have an epoxy prime exterior. Refer to City of Savannah Section 02554 - "Wastewater Collection System," Part 1.02, B.2a, for pipe connection within the wetwell. All piping and fittings shall receive protective coating as per Section 02555.

- B. Lift Station Valve Pit – Valve Pit shall be precast reinforced concrete sections conforming this to ASTM C-478 or cast-in-place Portland cement conforming to ASTM C150, type II 4,000 psi and absorption shall not exceed 6%. The footing shall be concrete placed on a dry, compacted sub grade. The footing shall be designed to prevent flotation of the empty wet-well structure. The valve pit shall be constructed to the dimensions shown on the drawings. The material shall be Aluminum Alloy 6063-T5 and T6, 1/4" (inch) tread plate, flush type lock with inside spoon handle. The frame shall be complete with hinged and hasp-equipped cover, upper guide holders, chain holders and stainless steel cable holder. Frame shall be securely mounted directly above the pumps. The door shall be torsion bar loaded for ease of lifting and shall have safety locking handle in open position. Fastening hardware used inside the valve pit shall be stainless steel.

The concrete valve pit sections shall be jointed with "Ram-Nek" joint sealer, or equivalent, with primer. The primer shall be applied to all contact surfaces of the concrete wall joint as recommended by the manufacturer. The exterior of all joints shall

be wrapped with an epoxy rubber "Infi-Shield seal wrap or equal with a minimum thickness of 65 mils.

For the protective coating on valve pits and the manholes, see City of Savannah Section 02555 - "Protective Coating for Existing and New Concrete and Masonry Sanitary Sewer Structures." Refer to City of Savannah Section 02554 - "Wastewater Collection System," Part 1.02, B.2a, for pipe connection within the valve pit. The valve pit shall be of the dimensions shown. Each pit shall have a valve pit hatch cover. The access hatch shall allow for the installation or removal of the plug and check valves. The covers as a minimum shall be:

Minimum Clear Opening	3'-0" x 4'-0"
Capacity	300 lbs/sq.ft.
Material	Aluminum Alloy 6063-T5 & T6, 1/4" tread plate with a neoprene gasket to make hatch water-tight.

Drains from the valve pits shall discharge back to the wet well and include drain line traps. Valve pits shall include vents with stainless steel screening.

- C. Plug Valves - Shall be of the non-lubricated, eccentric type conforming to AWWA C517 with resilient faced plugs, and Class 125 ANSI flanges. Valves to 20" size shall be round port or have a port area equivalent to 100% of full pipe area and all valves 24" and larger shall be 100% port area. Valve body and bonnet shall be made from ASTM A536 Grade 65-45-12 ductile iron or ASTM A126 Class B cast iron, internally and externally coated with 6-mil epoxy. Valve seats shall have a welded-in overlay of high nickel content on all surfaces contacting the plug face. Valves shall have permanently lubricated, stainless steel bearings in the upper and lower plug stem journals. All valves shall have bolted bonnets and adjustable compression packing or self-adjusting U-cup packing that can be replaced without removing the bonnet. All exposed nuts, bolts, springs, and washers shall be zinc plated. O-ring seals are not acceptable.

All valves larger than eight (8) inches shall be equipped with a gear actuator with handwheel. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant, with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. All exposed nuts, bolts, and washers shall be zinc plated.

All eccentric plug valves eight (8) inches or less shall be crossbar operated. A mechanical brake shall be provided and capable of locking the valve in any intermediate position between full open and full closed.

- D. Check Valves - Shall be of cushioned swing type and shall meet the materials requirements of AWWA specification C508. The valve shall be cast iron body, bronze mounted, single gate for non-shock working pressure of 175 psi. The valve shall be so constructed that by simply unbolting and lifting off the cover, the internal working parts may easily be removed and replaced without removing the valve from the line. The valve shall be furnished with outside lever and spring with non-corrosive adjustable air cushioned shock chamber. Check valves shall be suitable for mounting in horizontal lines or vertical lines when water flow is up. Check valves shall have a stainless steel hinge pin. Hinge pin shall operate in bronze support bearings. Check valves should close without any hammering action.
- E. Pressure Gauge – Pressure gauge shall be 0 to 100 psi unless otherwise indicated on the drawings. Gauge accuracy shall be within 0.5% of the total scale range. Provide diaphragm isolators on all gauges so that their materials of construction are resistant to wastewater. Pressure shall be transmitted to the gauge by a locked in and sealed fluid such as ethylene glycol or silicone oil. Elastomer shall be Butyl or Neoprene. The pressure gauge shall be equivalent to Series 40 as manufactured by Red Valve Co. The pressure gauge will be installed in the valve pit upstream of the plug valves. The installation shall include a 3/4" (inch) tap with a stainless steel nipple and ball valve for isolation. The ball valve shall be stainless steel.
- F. Pump Station Hose Bib – Shall be 3/4" size including meter, backflow prevention device and hose bib, as shown on City of Savannah Standard Construction Detail, W-23. Adhere to the minimum separation requirements for water and sewer lines as shown on the City of Savannah Standard Construction Detail WS-1.
- G. Flow meter – All pump stations that are controlled by Variable Frequency Drives shall have a flow meter in accordance with City of Savannah Section 13401 - "Flow Measurement Equipment."
- H. Pump Bypass Line – All lift stations shall include a pump bypass line, suitable for use with temporary pumps and for force main pigging. Bypass shall include female cam-lock fitting and plug valve. For larger stations, additional requirements may apply and designer shall coordinate with City.

- I. Yard Cover – The entire lift station site within the fenced area shall be covered with a layer of six-inch thick crusher run aggregate over a 40-mil visqueen under layer.
- J. Lighting – Lift station sites shall include a minimum of one pole-mounted, overhead street lamp. Lamp shall be positioned so that it will illuminate the control panel and wet well area.
- K. Site Fencing and Gate – Sewage pumping station site shall be completely enclosed by a gated security fence. Fencing shall be chain link galvanized steel (black powder coated with green vinyl coated wire) with privacy slats and barbed wire. Fencing shall be a minimum of eight feet tall (height includes barbed wire). A cantilever slide gate shall also be provided with a minimum clear opening of twelve (12) feet. If cantilevered gate is not possible due to space considerations or local requirements, gate shall open inward to the site without obstruction. These are minimum standards; local requirements may require different fencing material and heights.
- L. Sign - One sign shall be attached to the fence at the pump station with the appropriate lift station number. The sign shall be 30" x 24" (inches) and 1-1/8" (inches) thick made of white enameled aluminum with the following inscription:

NO TRESPASSING	[Red Letters]
CITY OF SAVANNAH	[Black Letters]
CONVEYANCE & DISTRIBUTION DEPARTMENT	[Black Letters]
LIFT STATION # _____	[Black Letters & Numbers]
351-3434	[Black Numbers]

- M. Access Road - Access Road to the station shall be as shown on the drawing. Stabilization shall be accomplished by constructing a base using eight (8) inches of crusher run aggregate.

1.03 PRODUCT REVIEW

The Contractor shall provide the Engineer with a complete description of all products before ordering. The Engineer will review all products before they are ordered. Contractor shall obtain approval from the Engineer.

PART 2 - EXECUTION

2.01 CONSTRUCTION OBSERVATION

The Engineer will have the right to require that any portion of the work be done in his presence and if the work is covered up after such instruction, it shall be exposed by the Contractor for observation. However, if the Contractor notifies the Engineer that such work is scheduled and the Engineer fails to appear within 48 hours, the Contractor may proceed without him. All work done and materials furnished shall be subject to review by the Engineer or Project Representative. Improper work shall be reconstructed. All materials which do not conform to the requirements of the specifications shall be removed from the work upon notice being received from the Engineer for the rejection of such materials. The Engineer shall have the right to mark rejected materials so as to distinguish them as such.

The Contractor shall give the Project Engineer or Project Representative a minimum of 48 hours notice for all required observations or tests.

It will also be required of the Contractor to keep accurate, legible records of the location of all pump stations, force mains, and appurtenances. These records will be prepared in accordance with the "Record Data" paragraph in the Special Conditions. Final payment to the Contractor will be withheld until all such information is received and accepted.

2.02 LOCATION AND GRADE

The grade and the position of all pumping stations, force mains, and other structures are shown on the drawings. The grade line as given on the profile or mentioned in these specifications means the invert or bottom of the pumping station and the price for installation shall include the excavation for the depth below this line necessary to install the pumping station to this grade, but measurements for payment will be made only to the grade line. Master control lines and bench marks shall be provided by the Engineer. The contractor shall be responsible for the proper locations and grade of the pumping stations and force mains.

2.03 EXCAVATION

The Contractor shall perform all excavations of every description and of whatever substance encountered to the depth shown on the plans or specified for all pumping stations, force mains and other appurtenances. All excavations shall be properly

dewatered before installations are made, by the use of well points, pumping or other methods accepted by the Engineer. The top portion of trenches may be excavated with sloping or vertical sides, except that the width of trench to a height of 2-feet above the top of the pipe shall not exceed 2-feet greater than the diameter of pipe.

Where the character of the soil is such that the Engineer determines it unsuitable for bedding, an additional foot of excavation will be authorized and the excavation backfilled with stone backfill. The limit of excavation shall be such to allow for placing and removing forms, installing sheeting, shoring, bracing, etc. The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks, driveways, power poles, etc. Drainage shall be kept clear.

2.04 BRACING AND SHEETING

The sides of all trenches and excavations shall be securely held by stay bracing, or by skeleton or solid sheeting and bracing, as required by the soil conditions encountered, to protect the adjoining property and for safety. Where shown on the drawings or where directed by the Engineer, the Contractor must install solid sheeting to protect adjacent property and utilities. The sheeting shall be steel or timber and the Contractor shall submit design data, including the section modulus of the members and the arrangement for bracing at various depths, to the Engineer for review before installing the sheeting. It shall penetrate at least three (3) feet below the pumping station or force main invert. Sheeting shall be removed in units when the backfilling has reached the elevation necessary to protect the pumping station, force main, adjoining property and utilities.

When sheeting or shoring cannot be safely removed, it shall be left in place. Timber left in place shall be cut off at least two (2) feet below the surface. No separate payment shall be made for bracing and sheeting except where shown on the drawings or authorized by the Engineer.

2.05 SEWAGE PUMPING STATION

The underground pumping station and valve pit shall be built in holes kept dry by pumping or well points. The base shall be placed on compacted bedding material so structure is plumb and pipe inverts are at proper elevations. The barrel and top sections shall be placed in the appropriate height combinations. All lifting holes inside and out shall be plugged with non-shrink grout. The sealing of joints between precast sections shall be completed as described in this Section – 02558, Part 1.02 A. Backfilling shall be

made with selected sandy material compacted by mechanical tamping to 98% density when tested by AASHTO Method T-191 or T-238. Depth of wet well shall not exceed twenty-eight (28) feet below proposed grade.

The wetwell shall be constructed of pre-cast or reinforced concrete to the dimensions shown on the drawings. The foundations shall be placed on well compacted, dewatered soil. The top shall be reinforced concrete of the dimensions shown on the drawings. Concrete shall conform to ASTM Standard C-94 for ready-mixed concrete. Construction shall be in accordance with applicable portion of "Building Code Requirements for Reinforced Concrete" (A.C.I. - 318). Class A concrete shall have a 4,000 psi compressive strength at 28 days.

Pump station sections with honeycomb defects, exposed reinforcing, broken / fractured bells or spigots, or cracked walls will be subject to rejection by the Engineer for the use on the project.

The pumping station site shall be graded to drain to conform to the drawings. The fence, access road and grassing shall be constructed in accordance to the approved design after the site has been graded.

The Contractor shall connect to the water main with a saddle or tee and lay one (1) inch diameter (minimum) pipe to the 3/4" hose bib at the station. The hose bib riser pipe shall be schedule 40 galvanized steel. Pipe fittings shall be galvanized iron. Hose bib assembly shall extend two (2) feet above grade, and be set in a 12" x 12" x 4" concrete collar at the ground level. Backflow preventers are mandatory on all water lines inside a lift station according to the City of Savannah, Cross Connection Control Policy. Connection shall be disinfected and tested in accordance with AWWA C-601. Water shall not be used until favorable written test results have been furnished to the Engineer.

2.06 BACKFILLING

Backfilling and related structures Pump Stations shall be backfilled in accordance with City of Savannah Section 02200 - "Earth Work."

Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

Do not allow heavy machinery within five (5) feet of structure during backfilling and compacting.

2.07 STONE BACKFILL

Where, in the opinion of the Engineer, the subgrade of the pump station or related structures is unsuitable material, the Contractor shall remove the unsuitable material to 12-inches below the subgrade and furnish and place stone backfill to stabilize the subgrade. Attention is invited to the fact that the presence of water does not necessarily mean that stone backfill is required. If well points or other types of dewatering will remove the water, the Contractor shall be required to completely dewater the trench in lieu of stone backfill. Stone backfill will be limited to areas where well pointing and other conventional methods of dewatering will not produce a dry bottom. Stone shall be placed 12-inches deep and 2-feet wider than the structure.

2.08 RECORD DATA

It will be required of the Contractor to keep accurate, legible records of the location of all pumping station features in both the horizontal and vertical planes. These features include, but are not limited to: receiving manhole, influent piping, wet well, valve pit, effluent force main, hose bib, and backflow preventer. These records will be made available to the Engineer before his final review for incorporation into the Engineer's Record Drawings. Final payment to the Contractor will be withheld until all such information is received and accepted.

2.09 COMPACTION TESTING

Soil and compaction tests shall be made by a testing laboratory accepted by the Engineer and shall be made at the City's direction and expense. Failed tests shall be rescheduled at the City's direction and retesting shall be paid for by the Contractor. Laboratory tests of the soil shall be made in accordance with ASTM D-698. In-place density tests shall be made in accordance with ASTM D-1556 or D-2922. Results of the tests shall be furnished to the Engineer.

END OF SECTION 02558